



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11) **EP 1 281 345 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
05.02.2003 Bulletin 2003/06

(51) Int Cl.⁷: **A47L 15/42**

(21) Application number: **01830511.0**

(22) Date of filing: **31.07.2001**

(84) Designated Contracting States:
**AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU
MC NL PT SE TR**
Designated Extension States:
AL LT LV MK RO SI

(72) Inventor: **Gobbi, Ezio**
46037 Roncoferraro (MN) (IT)

(74) Representative: **Concone, Emanuele et al**
Società Italiana Brevetti S.p.A.
Via Carducci 8
20123 Milano (IT)

(71) Applicant: **Bonferraro S.p.A.**
37060 Bonferraro (VR) (IT)

(54) **Seal for dishwasher door**

(57) A seal to be applied along the bottom side of the door (S) of a dishwasher is made up of an upper rigid part (R), provided with longitudinal ribs (N) and a hole (C) for securing it to the door (S), connected by co-extrusion to a lower elastic part shaped substantially as an inverted Y, so that when the door (S) is closed a top arm (M) abuts along the top edge of the tank (V) and a bottom arm (L) is in contact with the tank (V) at a lower

position, the arm (L) being sized and shaped to remain always in contact with the tank (V) of the dishwasher at any position of the door (S). This seal is designed in particular for a built-in dishwasher having a door (S) which is provided with a decorative panel (P) and rotates around hinges which determine not only the rotation but also the raising of the door (S) so as to allow the panel (P) to climb over a bottom plinth.

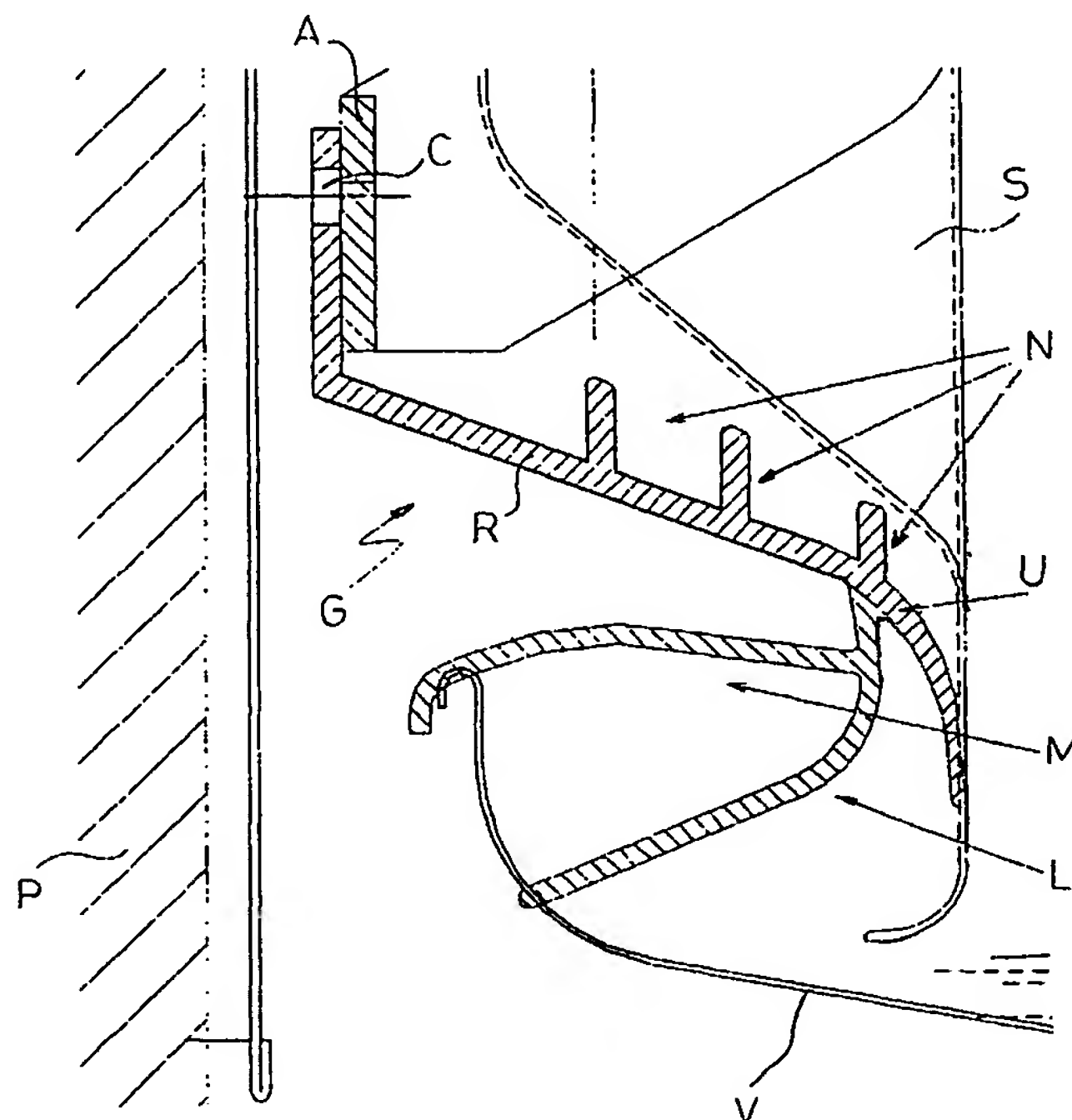


Fig. 2

Description

[0001] The present invention relates to dishwashers, and in particular to a seal to be applied along the bottom side of the door.

[0002] It is known that seals are provided in dishwashers between the door and the tank to prevent the leaking of water and vapour, and the seal along the bottom side is the most critical. In fact, while along the other three sides the contact is made only upon closure of the door, along the bottom side the seal must guarantee the water-tightness in any position of the door from completely open to completely closed.

[0003] This is necessary because some liquid can gather on the inside of the door for various reasons, e. g. during the loading of the dishes, or at the end of the washing cycle if the drying is not carried out or still if the dishwasher is opened after the cycle has started in order to add some item to be washed which remained outside. In all of these instances, it could happen that the liquid flows down along the inside of the door and falls directly on the floor, or it could splash on the tank bottom creating drops which in turn fall on the floor.

[0004] Therefore conventional dishwashers are provided along the bottom side of the door with a specific shaped seal which remains in contact with the tank bottom regardless of the angle of inclination of the door. However this known solution is not applicable to built-in dishwashers provided with a decorative panel which reproduces the appearance of the other doors of the kitchen furniture, so that the dishwasher is "camouflaged".

[0005] In this case, in fact, the dishwasher door rotates around "variable-fulcrum" hinges which determine not only the rotation but also the raising of the door, to allow the decorative panel to climb over the bottom plinth with which it would otherwise interfere. As a result, the bottom seal used for doors rotating around fixed-fulcrum hinges is unsuitable in that during the opening it does not remain in contact with the tank bottom, thus allowing the fall of drops on the floor.

[0006] In order to overcome this problem there is presently used a bellows seal, secured at one end to the door and at the other end to the tank bottom. Such a solution, though effective, has drawbacks as to manufacturing cost and reliability, in particular concerning the endurance of the bending areas of the bellows which by repeatedly undergoing thermal and mechanical cycles may prematurely fail.

[0007] Therefore the object of the present invention is to provide a seal which is free from said drawbacks. This object is achieved by means of a seal having the characteristics disclosed in claim 1. Other advantageous features of the present seal are disclosed in the subsequent claims.

[0008] The main advantage of the present seal is that of combining the economicity and reliability of conventional seals with the sealing capacity at any door position typical of bellows seals.

[0009] Another advantage of this seal is that it can be advantageously used also on doors with fixed-fulcrum hinges to guarantee, without a significant increase in cost, a higher tightness reliability in time.

5 [0010] These and other advantages and characteristics of the seal according to the present invention will be clear to those skilled in the art from the following detailed description of an embodiment thereof, with reference to the annexed drawings wherein:

10

Fig.1 is a cross-sectional vertical view of the bottom forward portion of a dishwasher provided with the present seal, with the door in the closed position;

15

Fig.2 is an enlargement of frame E of the previous figure which shows in detail the seal shape;

Fig.3 is a view similar to fig. 1 with the door in a half-open position; and

20

Fig.4 is a view similar to fig. 1 with the door in the fully open position.

25

[0011] Referring to said figures, there is illustrated a dishwasher with a door S covered by a panel P the bottom side of which must follow path T during the movement for opening and closure in order not to interfere with plinth Z. The sealing along the bottom side of door S is guaranteed by a seal G secured at the top to a bracket A of said door, and in contact with the edge of the tank V formed in the bottom B of the dishwasher.

30

[0012] As illustrated in detail in the enlargement of fig. 2, seal G is made up of two co-extruded parts connected at portion U. The upper supporting part R is made of a rigid material, provided with longitudinal ribs N and a hole C for securing it to bracket A, and abuts against the inside of door S. The lower part, on the contrary, is made of a soft and elastic material, and is shaped as an inverted Y with a top arm M abutting along the top edge of tank V, and a bottom arm L in contact with the tank at a lower position.

35

40

[0013] In this position of closed door it can be noted that the present seal guarantees a perfect tightness in that both arms L, M prevent water and vapour from leaking out of the tank, and in the same way the rigid part R prevents their penetration between door S and panel P. Therefore such a seal provides a better sealing when the door is closed, regardless of the type of hinges around which the door rotates upon opening.

45

[0014] Figs.3 and 4 clearly show how this seal provides the sealing also with the half-open or open door, thanks to arm L which remains in contact with tank V even when arm M moves away therefrom due to the rotation and raising of door S. In practice, the shape and the elastic material of the lower part of seal S make sure that arm L always remains in contact with tank V, while arm M guarantees the sealing at closed door even in the case of a residual plastic deformation of arm L which might occur in time.

50

55

[0015] It is clear that the above-described and illustrated embodiment of the seal according to the invention

is just an example susceptible of various modifications. In particular, the exact shape of the seal may be somewhat changed as long as it includes an upper rigid part and a lower elastic part provided with two arms of which the bottom arm is sized and shaped to remain always in contact with the tank. 5

Claims

1. Seal for the door (S) of a dishwasher, **characterized in that** it includes an upper rigid part (R) connected to a lower elastic part provided with two arms (L, M) of which at least one arm (L) is sized and shaped to remain always in contact with the tank (V) of the dishwasher at any position of the door (S), and the other arm (M) is in contact with said tank (V) at least when the door (S) is in the closed position. 10 15 20
2. Seal for dishwasher door according to claim 1, **characterized in that** the rigid part (R) is provided with longitudinal ribs (N) and a hole (C) for securing it to the door (S). 25
3. Seal for dishwasher door according to claim 1 or 2, **characterized in that** the elastic part is shaped substantially as an inverted Y so that when the door (S) is closed a top arm (M) abuts along the top edge of the tank (V), and a bottom arm (L) is in contact with said tank (V) at a lower position. 30
4. Seal for dishwasher door according to one or more of the preceding claims, **characterized in that** it is made up of two co-extruded parts connected at a connecting portion (U). 35
5. Dishwasher **characterized in that** it includes a seal according to one or more of the preceding claims. 40
6. Dishwasher according to claim 5, **characterized in that** the door (S) is provided with a decorative panel (P) and rotates around hinges which determine not only the rotation but also the raising of the door (S) so as to allow said panel (P) to climb over a bottom plinth (Z). 45

50

55

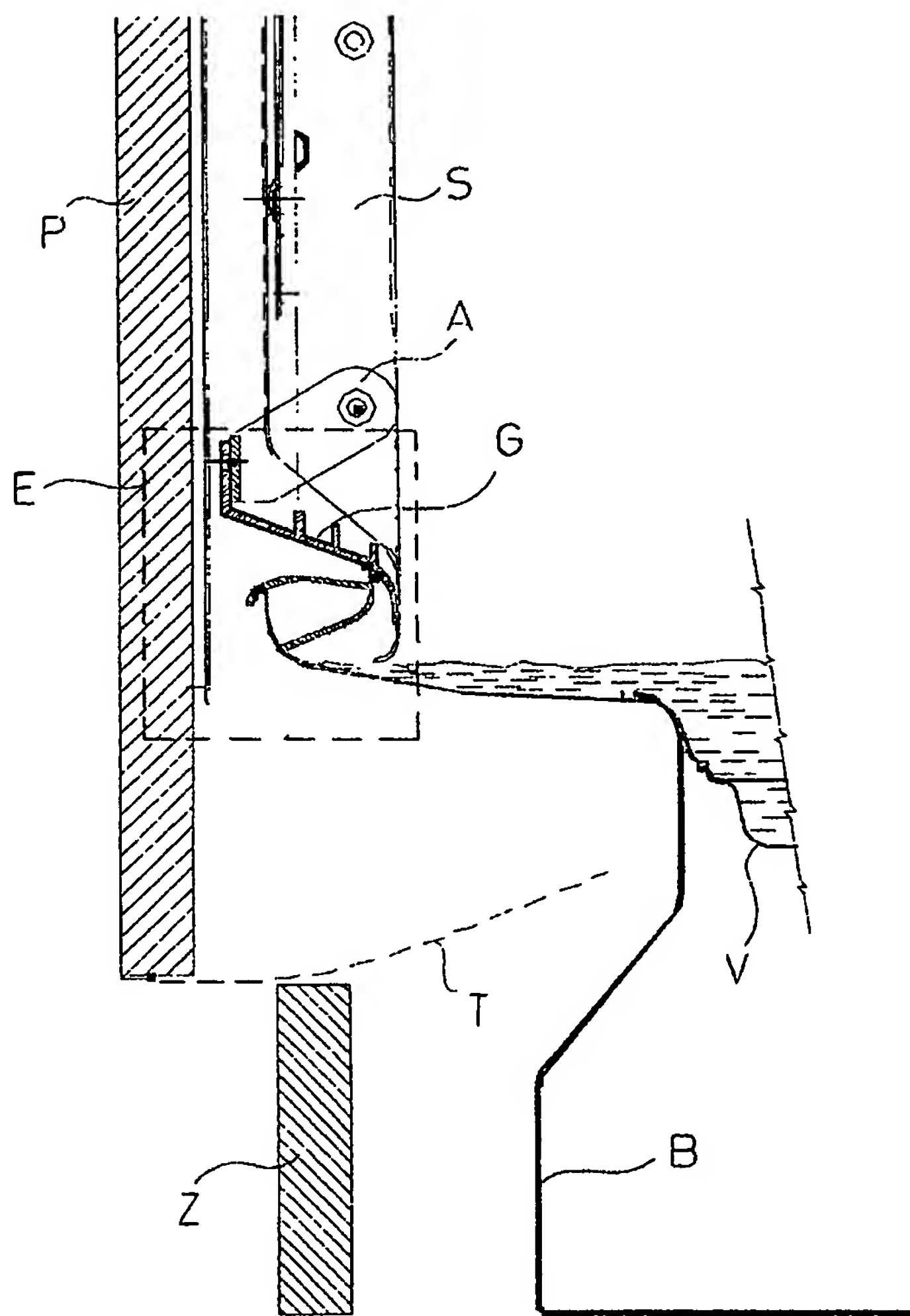


Fig. 1

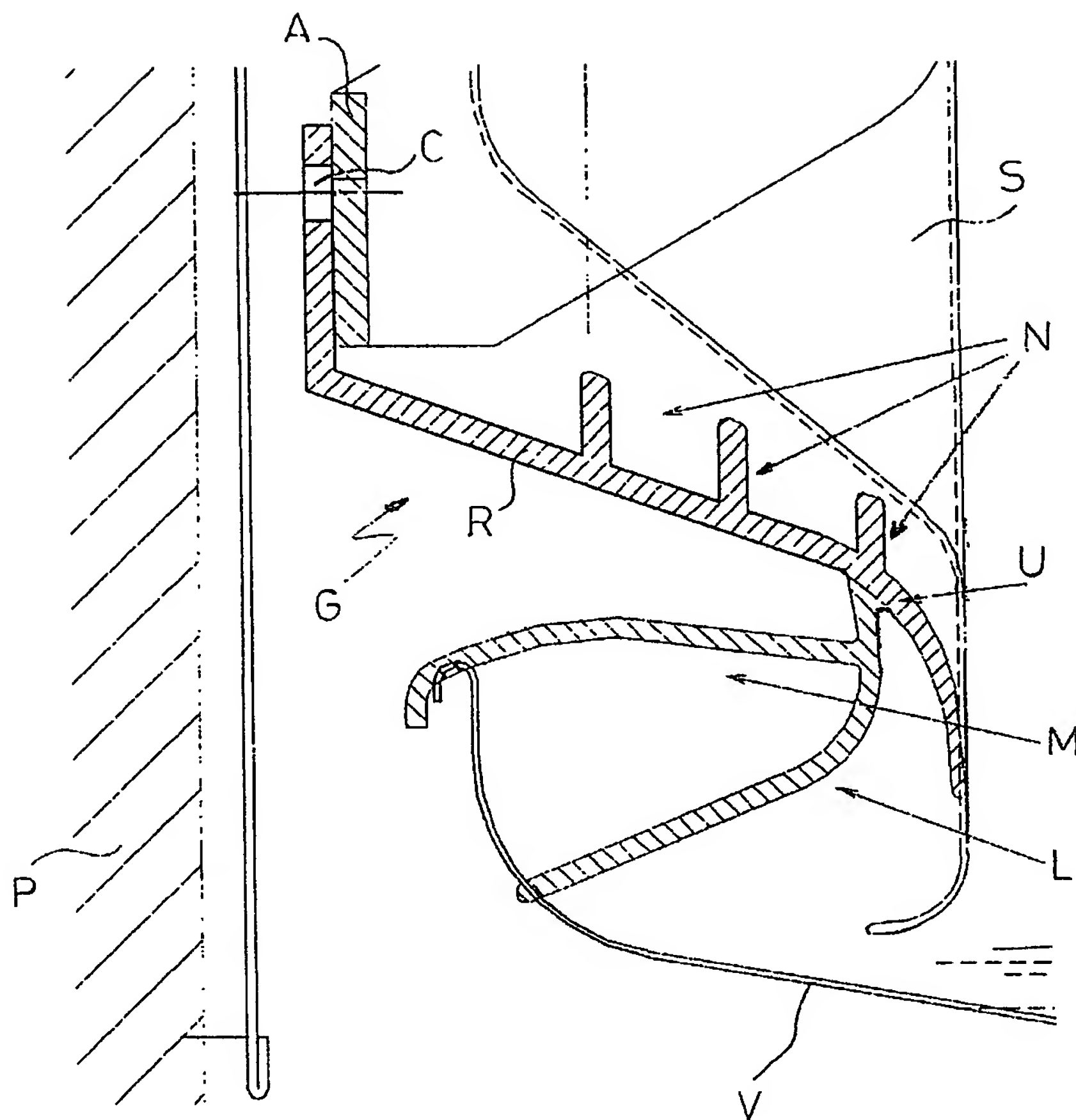


Fig. 2

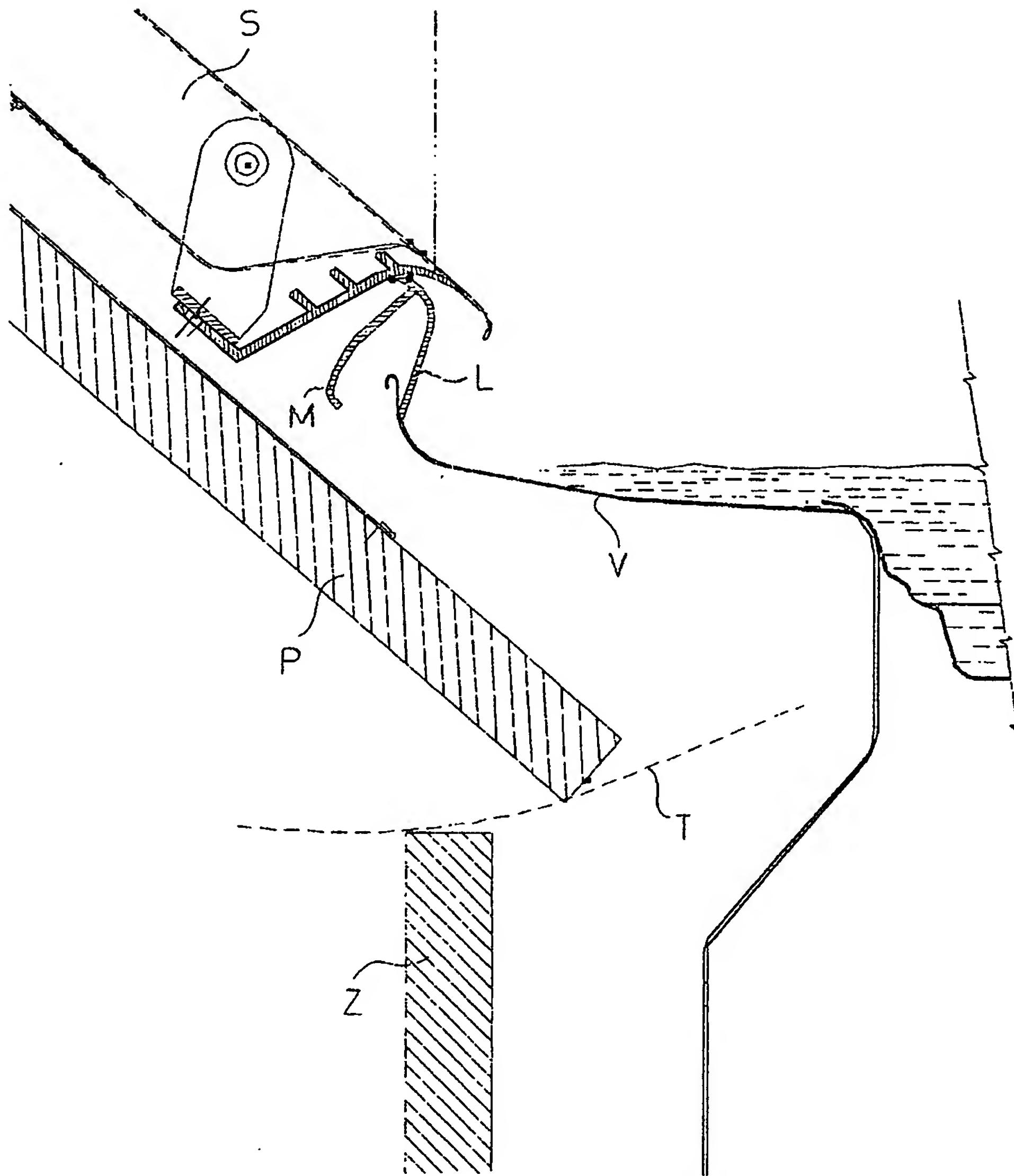


Fig. 3

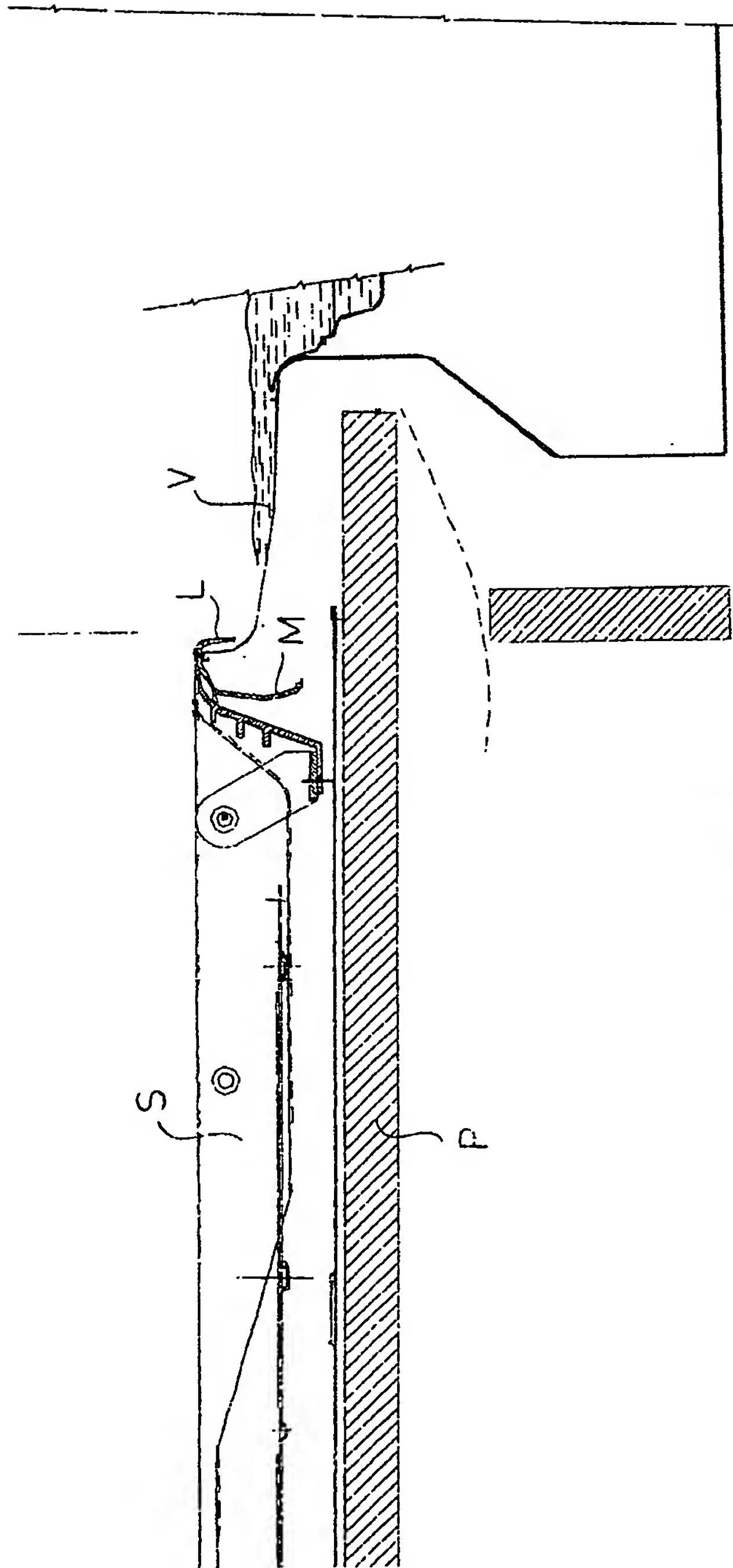


Fig. 4



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 01 83 0511

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	GB 2 130 479 A (BOSCH SIEMENS HAUSGERAETE) 6 June 1984 (1984-06-06)	1,2,4-6	A47L15/42
Y	* page 1, line 67 - page 1, line 120; figure 1 *	3	
Y	FR 2 530 943 A (INDESIT) 3 February 1984 (1984-02-03) * page 3, line 10 - page 3, line 28; figure 3 *	3	
A	DE 35 41 777 A (BOSCH SIEMENS HAUSGERAETE) 27 May 1987 (1987-05-27)		
A	DE 38 05 802 A (BOSCH SIEMENS HAUSGERAETE) 7 September 1989 (1989-09-07)		
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int.Cl.7) A47L D06F
Place of search MUNICH		Date of completion of the search 18 December 2001	Examiner Martin Gonzalez, G
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 01 83 0511

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

18-12-2001

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
GB 2130479 A	06-06-1984	DE 3242640 A1	24-05-1984
		FR 2536268 A1	25-05-1984
		IT 1166547 B	06-05-1987
FR 2530943 A	03-02-1984	FR 2530943 A3	03-02-1984
DE 3541777 A	27-05-1987	DE 3541777 A1	27-05-1987
DE 3805802 A	07-09-1989	DE 3805802 A1	07-09-1989
		FR 2627373 A3	25-08-1989
		GB 2215991 A ,B	04-10-1989
		IT 215724 Z2	26-10-1990

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82